

Electrical Installation Guide & Wiki



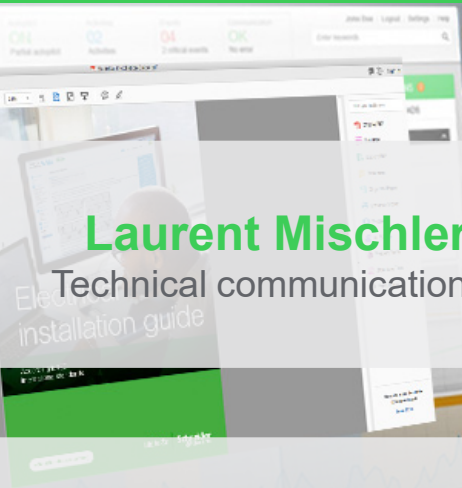
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1

Electrical Installation Wiki & Guide
A quick introduction

2

Structure of the Guide & Wiki

3

Navigation through the new wiki

4

**Technical implementation using
Semantic properties**

$$U=Rx?$$

Those things that were once
on the tip of your tongue

**can now be found
with the tips of your fingers**





Find them on

Electrical Wiki
www.electrical-installation.org



Download the
**Electrical
Installation**

Guide 2018

Electrical Installation Guide

What is the content of this guide/wiki ?

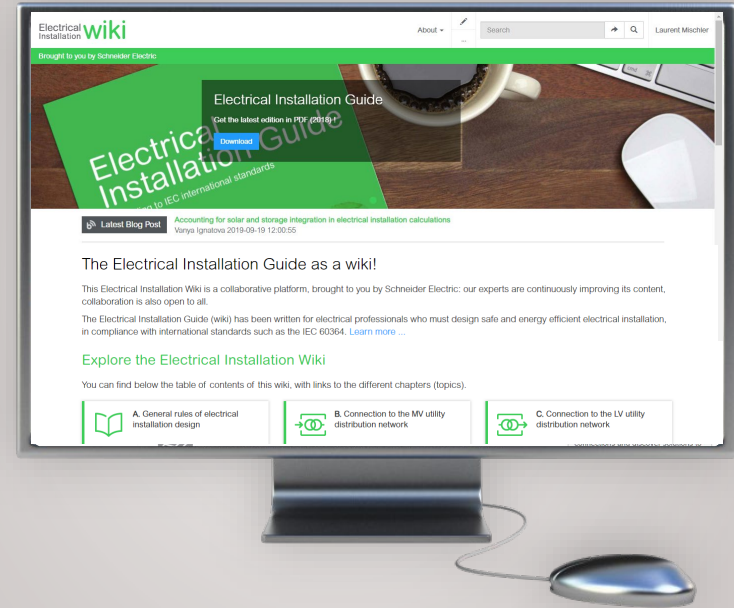
- a technical bible, created 25+ years ago
- helping electrical engineers (consultants, contractors ...) to design safe and efficient electrical installations according to international standards (IEC), such as the [IEC 60364](#)
- state-of-the-art knowledge
- written and updated by our experts
- 600+ illustrations, 200+ math formulas, 230+ tables ...
- has been translated in 10+ languages



Electrical Installation **wiki**

The Electrical Installation **Wiki** is:

- the same content as the Electrical Installation Guide (EIG)
- on the web, accessible by anyone
- a wiki, like wikipedia = open to external contributions
- the english wiki is live since 2010



General contents

General rules of electrical installation design

A

Connection to the MV utility distribution network

B

Connection to the LV utility distribution network

C

MV & LV architecture selection guide for buildings

D

LV Distribution

E

Protection against electric shocks and electrical fires

F

Sizing and protection of conductors

G

LV switchgear: functions & selection

H

Overvoltage protection

J

Energy efficiency in electrical distribution

K

Power Factor Correction

L

Harmonic management

M

Characteristics of particular sources and loads

N

Photovoltaic installations

P

Residential premises and other special locations

Q

EMC guidelines

R

Measurement

S

The book contains 17 chapters (topics)



A. General rules of electrical installation design



B. Connection to the MV utility distribution network



C. Connection to the LV utility distribution network



D. MV & LV architecture selection guide for buildings



E. LV Distribution



F. Protection against electric shocks and electric fires



G. Sizing and protection of conductors



H. LV switchgear: functions and selection



J. Overvoltage protection



K. Energy Efficiency in electrical distribution



L. Power Factor Correction



M. Power harmonics management



N. Characteristics of particular sources and loads



P. PhotoVoltaic (PV) installation



Q. Residential and other special locations



R. ElectroMagnetic Compatibility (EMC)



S. Measurement

Chapter A
General rules of electrical installation design

Section with 9 paragraphs

1

Methodology

A2

2

Rules and statutory regulations

A5

3

Installed power loads - Characteristics

A11

4

Power loading of an installation

A17

2.1

Definition of voltage ranges

A5

2.2

Standards

A6

2.3

Quality and safety of an electrical installation

A7

2.4

Initial testing of an installation

A8

2.5

Put in out of danger the existing electrical installations

A8

2.6

Periodic check-testing of an installation

A9

2.7

Environment

A10

3.1

Induction motors

A11

3.2

Resistive-type heating appliances and incandescent lamps (conventional or halogen)

A13

3.3

Fluorescent lamps

A14

3.4

Discharge lamps

A15

3.5

LED lamps & fixtures

A16

4.1

Installed power (kW)

A17

4.2

Installed apparent power (kVA)

A17

4.3

Estimation of actual maximum kVA demand

A18

4.4

Example of application of factors k_u and k_s

A21

4.5

Choice of transformer rating

A22

4.6

Choice of power-supply sources

A23

Each chapter has several sections, generally composed of several paragraphs

> Standards

[edit]

This Guide is based on relevant IEC standards, in particular IEC 60364. IEC 60364 has been established by engineering experts of all countries in the world comparing their experience at an international level. Currently, the safety principles of IEC 60364 series, IEC 61140, 60479 series and IEC 61201 are the fundamentals of most electrical standards in the world (see table below).

IEC 60364-1	Low-voltage electrical installations - Fundamental principles, assessment of general characteristics, definitions
IEC 60364-4-41	Low-voltage electrical installations - Protection for safety - Protection against electric shock
IEC 60364-4-42	Low-voltage electrical installations - Protection for safety - Protection against thermal effects
IEC 60364-4-43	Low-voltage electrical installations - Protection for safety - Protection against mechanical damage
IEC 60364-4-44	Low-voltage electrical installations - Protection for safety - Protection against fire
IEC 60364-5-51	Low-voltage electrical installations - Selection of conductors of fixed installations
IEC 60364-5-52	Low-voltage electrical installations - Selection of conductors of flexible cables
IEC 60364-5-53	Low-voltage electrical installations - Selection of conductors of overhead lines
IEC 60364-5-54	Low-voltage electrical installations - Selection of conductors of underground cables
IEC 60364-5-55	Low-voltage electrical installations - Selection of conductors of overhead lines
IEC 60364-5-56	Low-voltage electrical installations - Selection of conductors of underground cables
IEC 60364-6	Low-voltage electrical installations - Verification
IEC 60364-7-701	Low-voltage electrical installations - Requirements for special installations or parts of installations

> Induction motors

Contents [show]

The nominal power in kW (P_n) of a motor indicates its rated equivalent mechanical power output.
The apparent power in kVA (P_a) supplied to the motor is a function of the output, the motor efficiency and the power factor: $P_a = \frac{P_n}{\eta \cos \varphi}$

> Current demand

The rated current supplied to the motor is given by the following formulae:

> 3-phase motor

$$I_n = \frac{P_n \times 10^3}{\sqrt{3} \times U \times \eta \times \cos \varphi}$$

> 1-phase motor

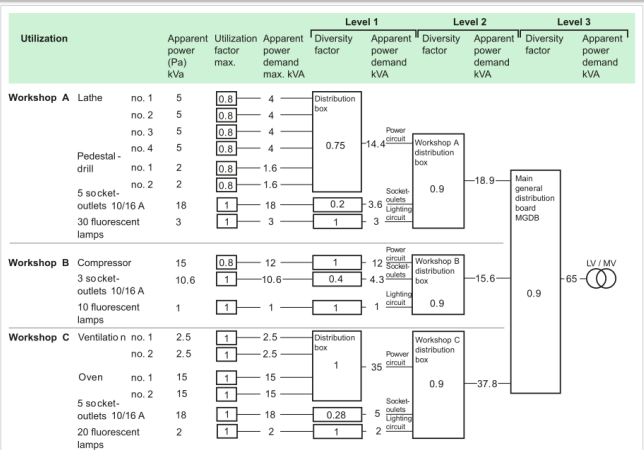
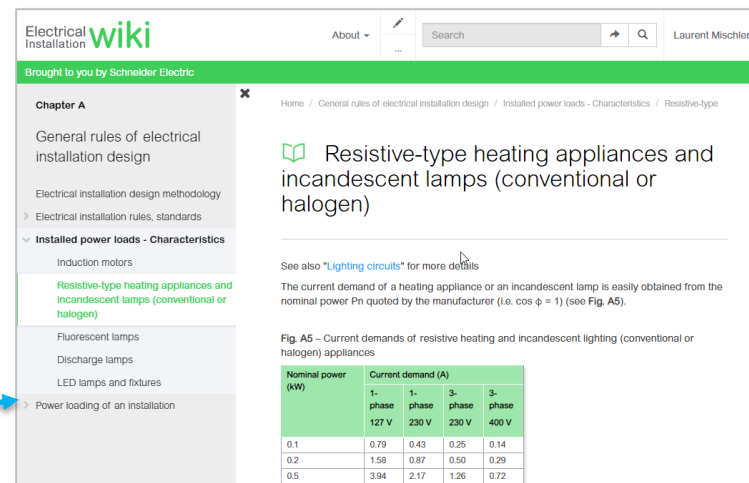
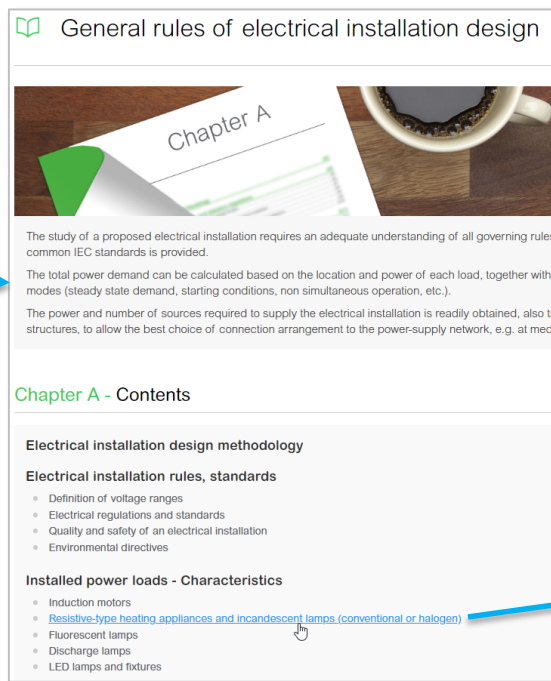
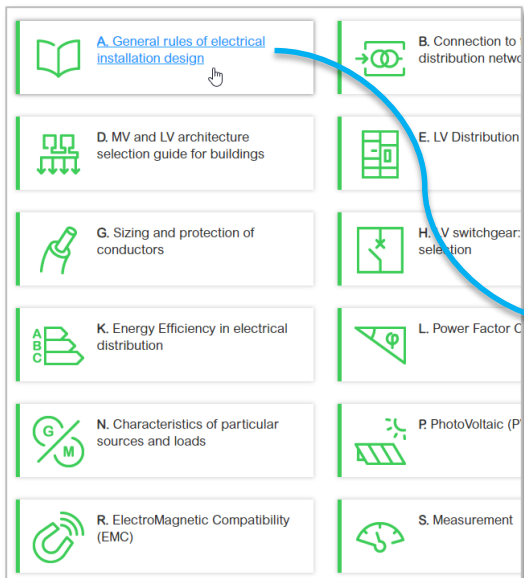


Fig. A15. An example in estimating the maximum predicted loading of an installation (the factor values used are for demonstration purposes only)

Let's take a look at how this navigation « structure » has been implemented in the new version of the Electrical Installation Wiki ...



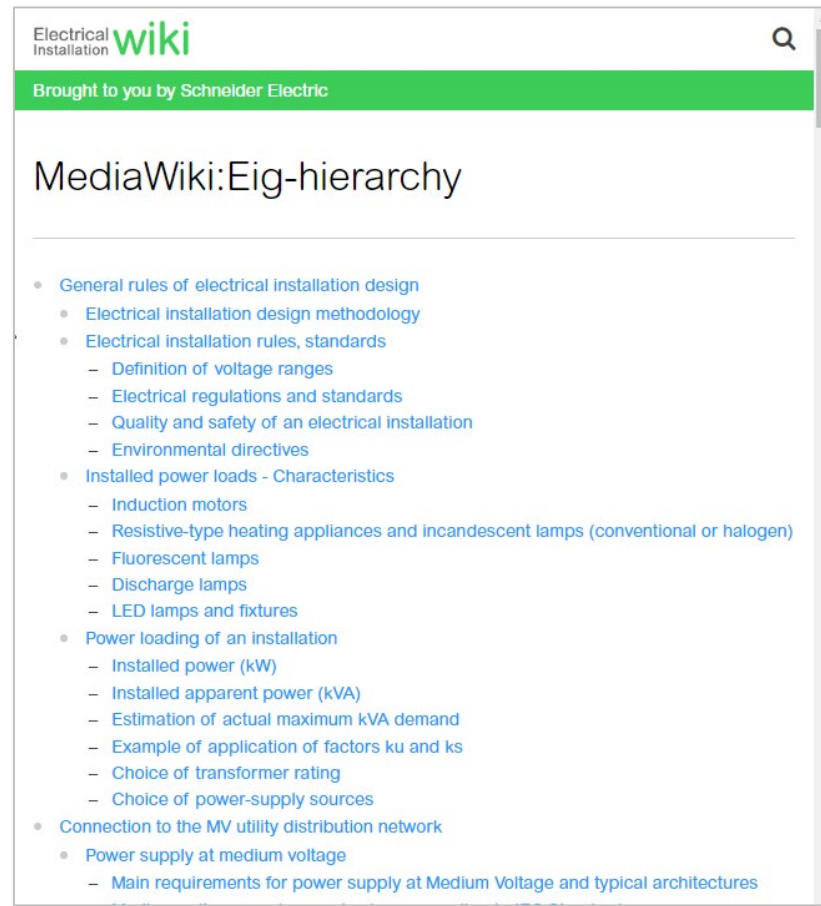
How did we implement
this solution in Mediawiki,
with the help of Semantic
Mediawiki ?

How is the navigation automated in EIG Wiki ?

There is only **one source** for the book **structure** and **all navigation** related tools:

- MediaWiki:Eig-hierarchy

Maintenance is simplified: only one page to modify



The screenshot shows a web browser displaying the 'Electrical Installation wiki' page. The page has a green header bar with the text 'Brought to you by Schneider Electric'. The main content area is titled 'MediaWiki:Eig-hierarchy' and contains a hierarchical list of links. The list is organized into several main categories, each with a bullet point, and sub-categories are indented. The links are in blue text, indicating they are clickable. The page also features a search icon in the top right corner.

Electrical Installation **wiki**

Brought to you by Schneider Electric

MediaWiki:Eig-hierarchy

- General rules of electrical installation design
 - Electrical installation design methodology
 - Electrical installation rules, standards
 - Definition of voltage ranges
 - Electrical regulations and standards
 - Quality and safety of an electrical installation
 - Environmental directives
- Installed power loads - Characteristics
 - Induction motors
 - Resistive-type heating appliances and incandescent lamps (conventional or halogen)
 - Fluorescent lamps
 - Discharge lamps
 - LED lamps and fixtures
- Power loading of an installation
 - Installed power (kW)
 - Installed apparent power (kVA)
 - Estimation of actual maximum kVA demand
 - Example of application of factors k_u and k_s
 - Choice of transformer rating
 - Choice of power-supply sources
- Connection to the MV utility distribution network
 - Power supply at medium voltage
 - Main requirements for power supply at Medium Voltage and typical architectures

How is the main Hierarchy page used – general principle

Each “inside” page in the book has a “**Has parent page**” property. This property is added with the help of **Hierarchy Builder** extension, using **#hierarchyParent**.

Fluorescent lamps	
Has table id	Tab1008 + 🔍 , Tab1009 + 🔍
Categories	Chapter - General rules of electrical installation des
Modification date	12:17:05, 11 July 2019 + 🔍
Has parent page	Installed power loads - Characteristics + ⓘ

```
{{#set:Has parent page={{#hierarchyParent:{{FULLPAGENAME}}|{{MediaWiki:eig-hierarchy}}|hierarchyargtype=wikitext|link=none}}}}
```

In addition, the first level (chapter pages) are set with the main page as parent.

Note: we had to update the extension to take into account extra characters in page titles (multilinguism)

```
$currentPagePattern = '/\[\' . '\Q' . str_replace('/','', $targetPageName) . '\E' . '\]\]/';
```

```
$numMatches = preg_match_all( $currentPagePattern, '\Q'.str_replace('/','', $row).\E', $matches );
```

Automatic generation of chapters Table of Contents

Each chapter has its own **summary**

It is generated automatically from the main hierarchy with **#hierarchySubtree**

```
{{#hierarchySubtree:{{FULLPAGENAME}}|{{Mediawiki:eig-hierarchy}}|hierarchyargtype=wikitext|sep=<br />|format=ul}}
```

Chapter A - Contents
Electrical installation design methodology
Electrical installation rules, standards
<ul style="list-style-type: none">• Definition of voltage ranges• Electrical regulations and standards• Quality and safety of an electrical installation• Environmental directives
Installed power loads - Characteristics
<ul style="list-style-type: none">• Induction motors• Resistive-type heating appliances and incandescent lamps• Fluorescent lamps• Discharge lamps• LED lamps and fixtures
Power loading of an installation
<ul style="list-style-type: none">• Installed power (kW)• Installed apparent power (kVA)• Estimation of actual maximum kVA demand• Example of application of factors k_u and k_s• Choice of transformer rating• Choice of power-supply sources

Side navigation Menu

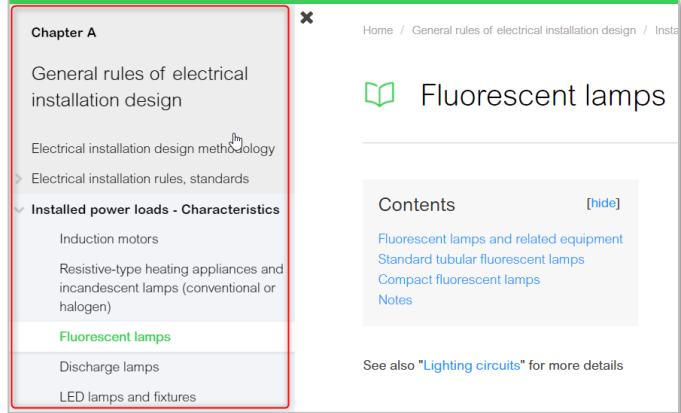
For the left navigation menus (1 per chapter), the chapter hierarchy is generated in a similar way using **#hierarchySubtree**

```
{{#hierarchySubtree:{{#var:chapter-toc-page}}|{{Mediawiki:eig-hierarchy}}|hierarchyargtype=wikitext|sep=<br />|format=ul}}
```

This chapter hierarchy is then invoked with the Dokit **SideSummary extension**, which displays and manages the **sidemenu on the left** (navigation menu inside the current Chapter)

```
{{#sideSummary:chapter-structure-mw-message}}
```

Note: this is also compatible with the **DisplayTitle** extension, so if a DisplayTitle has been defined for a particular page, the link text in the sidemenu will reflect this Display Title

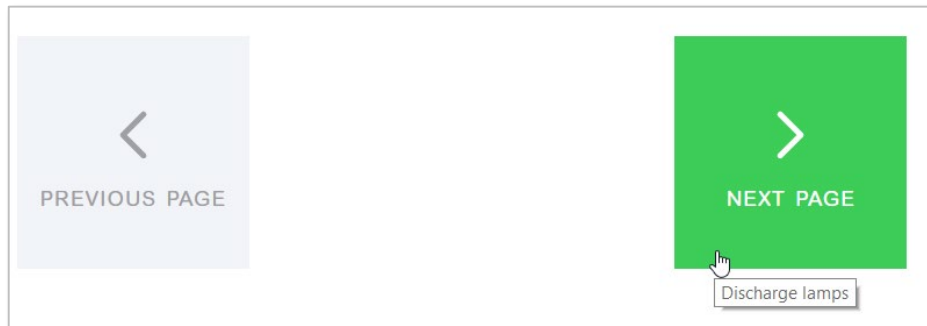


« Prev-Next » buttons

To implement the “prev – next” buttons at the bottom of page (navigation to previous next page in the hierarchy), we have modified the **formatBreadcrumb** function in HierarchyBuilder.php to generate suitable html

The CSS classes `previous` and `next` are used to manage the look&feel of the links (big buttons)

```
private static function formatBreadcrumb( $previous, $parent, $next ) {  
    $breadcrumb = "<ul class='pager'>" . PHP_EOL;  
    if ( $previous != null ) {  
        $breadcrumb .= "<li class='previous'>[\" . $previous . \" | \" .  
        "Previous" . "]]</li>" . PHP_EOL;  
    } else {  
        $breadcrumb .= "" . PHP_EOL;  
    }  
    if ( $next != null ) {  
        $breadcrumb .= "<li class='next'>[\" . $next . \" | \" .  
        "Next" . "]]</li>" . PHP_EOL;  
    } else {  
        $breadcrumb .= "" . PHP_EOL;  
    }  
    $breadcrumb .= "</ul>" . PHP_EOL;  
    return $breadcrumb;  
}
```

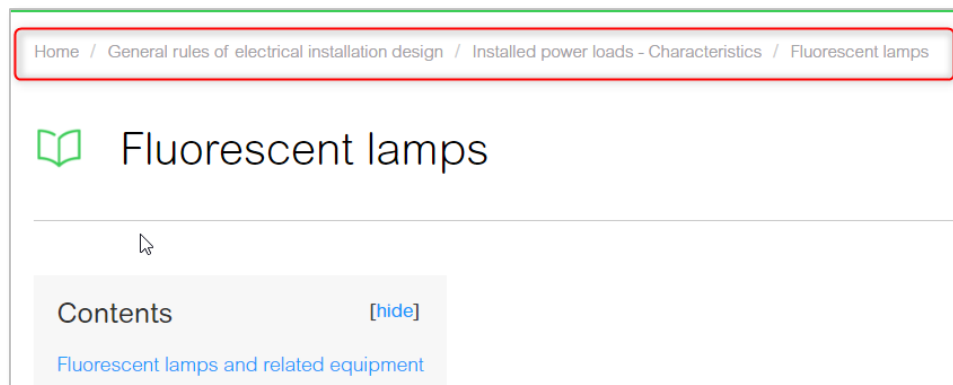


Breadcrumbs

The user can also navigate in the book with the breadcrumbs at the top of the page.

This is done with the **Semantic Breadcrumb Links** extension, also working with the "Has parent page" property only.

```
$GLOBALS['egSBLPropertySearchPatternByNamespace'] =  
array( NS_MAIN => array(  
    SBL_PROP_PARENTPAGE,  
    SBL_PROP_PARENTPAGE,  
    SBL_PROP_PARENTPAGE,  
    SBL_PROP_PARENTPAGE  
)
```



In complement ...

Working with SMW gave us some more ideas for the structuration of the book/wiki

Each **figure** or **table** in the book (wiki) is marked as a property of the page where it is displayed:

- **"Has figure id", "Has table id"**

It allows the creation of an index of figures and tables, and where they can be found

There is more to explore in the future, like possibly providing the possibility to search pages by topic, standards, local country specificities ... provided that we are able to define the relevant Semantic Properties



Q&A

Life Is On



Schneider
Electric